

Topic 5: Homeostasis and response

AQA GCSE Biology 8461 · spec 4.5 · sheets 5.1–5.4

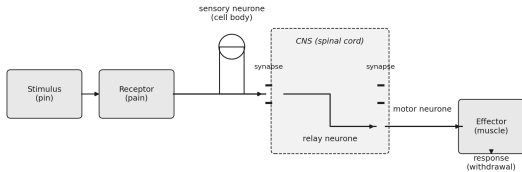
Steady inside, changing outside

- Homeostasis keeps internal conditions optimal for enzymes.
- Receptors sense, coordination centres decide, effectors respond.
- Nerves are fast and short; hormones are slow and long.

The nervous pathway

- Pathway: stimulus, receptor, coordinator, effector, response.
- Impulses travel along neurones to the CNS — brain and spinal cord.
- Effectors: muscles contract, glands secrete.

The reflex arc



- Automatic and rapid — no conscious brain involved.
- Sensory neurone, synapse, relay neurone, motor neurone.
- At a synapse a chemical diffuses across the gap.

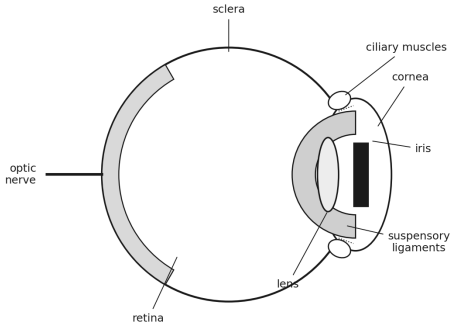
RP7 reaction time

- Ruler drop between finger and thumb, or a computer test.
- Same hand, same drop height; repeat and take the mean.
- Convert catch distance to time; compare factor against control.

Three brain regions

- The brain, the eye and temperature — biology only.
- Cerebral cortex — consciousness, memory, language.
- Cerebellum — balance and coordination of movement.
- Medulla — heartbeat and breathing.

The eye and accommodation



- Named parts: retina, optic nerve, sclera, cornea, iris, ciliary muscles, suspensory ligaments.
- Near: ciliary muscles contract, ligaments loosen, lens thick.
- Distant: muscles relax, ligaments tight, lens thin.

Short and long sight

- Myopia — image focuses in front of the retina; concave lens.
- Hyperopia — image focuses behind the retina; convex lens.
- Also contact lenses, laser surgery, replacement lens.

Too hot, too cold

- Control of body temperature.
- Too hot: vasodilation and sweating transfer energy away.
- Too cold: vasoconstriction, sweating stops, shivering.
- The thermoregulatory centre monitors blood temperature.

Hormones and glands

- Hormonal coordination in humans.
- Six glands on a diagram: pituitary, pancreas, thyroid, adrenal, ovary, testes.
- Hormones travel in blood to target organs; slower, longer than nerves.
- The pituitary is the master gland.

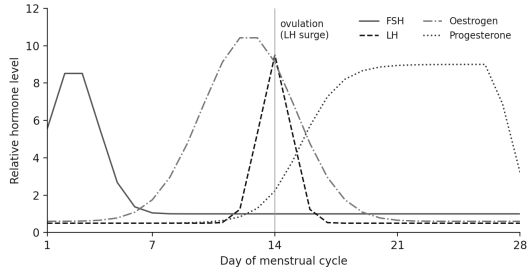
Insulin, glucagon and diabetes

- High glucose, then insulin moves glucose into cells, stored as glycogen.
- (HT) low glucose, then glucagon converts glycogen back to glucose.
- Type 1 — no insulin, injections; Type 2 — cells resist it, diet and exercise.

Water balance and the kidney

- Lungs and skin lose water uncontrolled; kidneys remove the rest.
- Filtration of blood, then selective reabsorption of glucose, ions, water.
- (HT) ADH from the pituitary makes tubules reabsorb more water; dialysis or transplant for failure.

The menstrual cycle



- FSH matures the egg; LH surge releases it — ovulation, about day 14.
- Oestrogen builds the lining; progesterone maintains it.
- (HT) read the four-hormone graph.

Contraception and IVF

- Hormonal: pill inhibits FSH; slow-release progesterone; barrier methods; IUDs; sterilisation.
- IVF (HT): FSH and LH, collect eggs, fertilise in the lab, transfer embryos.
- Weigh stress, success rates and multiple births.

Adrenaline and thyroxine

- Adrenaline — heart rate up, oxygen and glucose to brain and muscles.
- Thyroxine — basal metabolic rate, growth and development.
- Both explained through negative feedback.

Tropisms and auxin

- Phototropism — shoots bend towards light; gravitropism — roots grow down.
- Unequal auxin distribution causes unequal growth.
- RP8 with length measurements and labelled drawings.

Using plant hormones

- Auxins (HT): weed killers, rooting powders, tissue culture.
- Gibberellins (HT): end dormancy, promote flowering, bigger fruit.
- Ethene (HT): controls ripening in storage and transport.

Check yourself

- Checklist before you call this topic done.
- Reflex arc with synapse; accommodation table; temperature responses.
- Insulin/glucagon, kidney and ADH, four menstrual hormones, tropisms.